**Before the**
**FEDERAL COMMUNICATIONS COMMISSISION**
**Washington, D.C. 20554**

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| In the Matter of | ) | |
| | ) | |
| Proposed Changes in the Commission's Rules | ) | |
| Regarding Human Exposure to | ) | ET Docket No. 03-137 |
| Radiofrequency Electromagnetic Fields | ) | |
| | ) | |

To the Commission:

**Comments of Nokia Inc.**

Nokia Inc. ("Nokia") respectfully submits these Comments in response to the *Notice of Proposed Rulemaking* released by the Commission in the above referenced proceeding.[1]

## I. INTRODUCTION

Nokia is the world's leading supplier of mobile telephones and is a leading supplier of mobile, fixed and Internet Protocol networks and related services as well as multimedia terminals. Nokia is a broadly held company with listings on six stock exchanges. As a world leader in the wireless telecommunications, Nokia is pleased to have this opportunity to provide its initial comments in response to several of the Commission's proposals in the *NPRM*.

## II. COMMENTS

Nokia supports the Commission's intention to harmonize the rules governing RF exposure evaluation across a broad range of frequencies and services. In the increasingly fast-paced and competitive market for telecommunications equipment, changes in equipment evaluation and certification processes should be designed to simultaneously ensure the public's protection from potential adverse effects from RF exposure and to accelerate the pace at which new and exciting products can be brought to market and made available to consumers. Nokia believes that many of the proposals in the *NPRM*, as modified by these comments and those of others, will help achieve these important goals.

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[1] In the Matter of Proposed Changes in the Commission's Rules Regarding Human Exposure to Radiofrequency Electromagnetic Fields, *Notice of Proposed Rulemaking*, ET Docket No. 03-137 (rel. Jun. 26, 2003) ("*NPRM*").

As an initial matter, Nokia suggests that the Commission use more consistent and logical terminology when it refers to the power levels of various transmitters. For example, in the *NPRM*, the Commission uses each of the following terms in describing power levels related to RF evaluation: “maximum peak output power”; “the total transmitter power”; “power level”; “maximum peak output power levels”; “peak radiated or conducted output power”; “maximum peak conducted output power.” Nokia suggests that the Commission uses two terms consistently in the new rules: "maximum time-averaged conducted power" and "maximum time-averaged ERP/EIRP". Under this proposal, "Maximum time-averaged...." would mean the maximum power level from the handset or maximum total power from base station averaged over 30 min (which is the SAR averaging time).

### A. Routine Evaluation and Categorical Exclusion of Transmitters, Facilities and Operations

Nokia suggests that power, separation distance, antenna pattern and accessibility should be used to identify equipment that can be exempted from evaluation. Separation distance (near-field or far-field) vs. direction can be calculated from antenna pattern data readily available from antenna manufacturers or defined by measurements. This approach will provide a cost-effective and conservative EMF exposure evaluation methodology.

Nokia supports the proposal in the *NPRM* to establish a categorical exclusion for certain very low power transmitters, such as “micro” base stations and other fixed devices. The power thresholds proposed in the *NPRM*, coupled with the 20 cm separation requirement, will provide the public with sufficient protection while ensuring that these devices can be installed without delay.

With regard to self-installed subscriber end transceivers, Nokia suggests that these should be covered by clear instructions within the Installation Guide (or as installation instructions within the User’s Guide) stipulating that the antenna should be mounted so that nobody can

approach closer than the minimum separation distance. This text should be submitted to the FCC when filing an application for equipment authorization.

**B. RF Evaluation Requirements for Transmitter Modules**

Nokia agrees with the Commission that "the utility and flexibility of use of . . . transmitter modules would be greatly reduced if an individual certification were needed for each different use of a given module" and that the FCC should adopt "rules and guidelines for the approval and safe use of modular transmitters with a minimum of regulatory burden. "[2] Such policies will foster continued rapid innovation and growth in new radio technologies, ultimately benefiting consumers in the form of accelerated availability and lower prices for new products. For self-standing hosts (e.g. machine-to-machine transceivers designed to be installed in such appliances such as vending machines, elevators and wireless alarm systems), Nokia suggests the routine exclusion from testing of all transmitter modules with time-averaged transmit powers of less than 200 mW since these devices are neither worn on the body nor used at the ear. Nokia also suggests that in cases where a minimum separation distance of 20 cm exists, routine exclusions should be allowed where time-averaged transmit powers of less than or equal to 1.5 W ERP for frequencies up to 1.5GHz and less than or equal to 3 W ERP for frequencies above 1.5GHz exist.

Nokia further suggests that where 20 cm separation distance exists, an unlimited number of modules should be allowed to be installed provided that the simple arithmetic sum of the time-averaged transmit powers does not exceed 1.5 W for transmitters operating at frequencies below 1.5 GHz or 3 W for transmitters operating at frequencies above 1.5 GHz. Since these power thresholds are based on MPE whole-body exposure, we believe that with 20 cm separation distance there is sufficient margin to cover any differences in hosts.

Radiotelephones

With regard to the addition of modular transmitters to previously approved radiotelephone devices, Nokia supports the Commission's conclusion that the addition of a low power modular transmitter such as a Bluetooth module is unlikely to contribute to the overall SAR level of the

device and that such combinations should not require re-evaluation of the phone. Experience shows that adding such devices to a mobile phone has little or no impact on the basic SAR levels of the phone in either the cellular or PCS bands.

Nokia believes, however, that the 2 mW power threshold proposed by the Commission may be too low to cover some modular transmitters that may be used with mobile phones. To ensure routine exclusion from re-evaluation of all Class 2 Bluetooth and similar modular transmitters (1 mW nominal output power, 2.5 mW maximum), we suggest that the threshold for all transmitter modules should be increased from the suggested value to less than or equal to 3 mW output power. The change to a 3 mW limit would have at most a negligible impact on the overall SAR level of the combined device and thus would not affect its compliance. Nokia suggests that this exclusion be applied to both integrated and added low power transmitters. Nokia believes that up to 3 such transmitters could be added to a compliant device without need for additional SAR evaluation.

For higher power modules (as described above, those operating at power levels above 3 mW), Nokia suggests that if the SAR value of the combination of phone and module is the same or less than the original approved value for the phone, taking measurement uncertainty into account, then such an addition should be approved for operation as a Class 1 permissive change. If the SAR value of the combined device exceeds the original value by more than the expanded uncertainty, a Class 2 filing would be required.

An alternative approach would be for the FCC to allow the applicant to scale the measured SAR value of the host device by some set amount (we suggest up to 30%, which is the same margin of uncertainty for mobile phones currently permitted by FCC practice) to allow for the subsequent addition of transmitter modules, minor engineering changes or the addition of certain accessories that might have an effect on measured SAR values. Under the current FCC rules and practice, such minor modifications would often require a manufacturer to apply for a Class II permissive change due to uncertainties in the measurement system. Under the instant proposal, the reported SAR of a device would be an overly conservative value, yet would

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[2] *NPRM*, ¶ 20.

accommodate changes or additions to a device. This approach would allow for additions or modifications where the measured SAR result is below the scaled value to be approved for operation as Class 1 permissive changes.

Laptop (Notebook) Computers

With regard to the need to perform an RF evaluation for transmitter modules in laptop computers, the *NPRM* proposes two distinct power thresholds based on the position of the transmitter in the laptop. For transmitter modules mounted in the keyboard portion of the laptop, the Commission proposes routine exclusion from RF exposure evaluation if the module operates at less than 10 mW. For transmitter modules mounted in the screen portion of the laptop (with 20 cm separation), the power threshold limit is 200 mW. Nokia agrees with the Commission's proposed exclusion threshold limits for such configurations.

However, Nokia understands that the proposed new rules make no reference to laptops that have not been previously evaluated for RF exposure, i.e. those laptops without any built-in transmitters.[3] For modular transmitter devices designed to be used with such laptops, Nokia believes that the FCC's suggested exclusion threshold of 10mW for transmitter modules in the keyboard section is overly conservative for these cases. Nokia suggests that the FCC's rules apply the same power threshold limit that is adopted for 15.247 unlicensed devices.

Personal Digital Assistants (PDAs) and Similar Hand-held Devices

In the *NPRM*, the Commission notes that most PDAs are designed to be used as hand-held devices and so the SAR limit pertaining to the extremities – 4.0 W/kg averaged over ten grams – should be applied. For transmitting modules designed to be incorporated into hand-held PDAs, the FCC proposed a threshold value of 25 mW as an exclusion threshold for requiring SAR evaluation. Nokia believes that the proposed 25 mW threshold is too conservative as 25 mW

[3] Nokia interprets the FCC's statement in paragraph 26 of the *NPRM* -- "we believe it is unlikely that the SAR level of the combined device would change significantly as long as the peak conducted or radiated power is no more than 10 mW" – to mean that the proposed 10 mW and 200 mW power threshold limits apply to combinations of transmitter devices with laptops that have already been evaluated for SAR compliance, not to the addition of RF modules to previously unevaluated laptops.

power with 10g averaging can theoretically lead to a maximum 2.5 mW/g SAR level and cannot go over compliance limit of 4 mW/g. Nokia believes that the threshold value could be set significantly higher without causing the combined device to exceed the relevant compliance limit.

For PDAs that are designed to be used in contact with the head or worn against the body, the FCC proposed to use the same 2 mW threshold for additional transmitting modules that it proposed for modules used in mobile phones. As noted above, Nokia does not believe that the 2 mW threshold limit is adequate to cover some types of transmitter modules (e.g. Class 2 Bluetooth transmitters) that may be used in combination with PDAs. As explained above in relation to modules used with radiotelephones, we believe that the appropriate limit should be 3 mW and that this limit would have at most a negligible impact on the overall SAR level of the combined device and thus would not affect its compliance.

**C. Measurement of SAR from Multiple Transmitters**

The Commission notes that the issue of evaluating SAR for a device with multiple transmitters has been raised by various parties but has not been extensively addressed in elsewhere. The Commission proposes that, in the absence of a better predictive model, the maximum SAR values of all multiple antennas that functionally transmit at the same time be added together in order to determine RF exposure values for the device. As recognized by the Commission,[4] Nokia believes that this approach is likely to overestimate RF exposure since SAR peaks could easily appear in different places, particularly if different frequencies or antennas are used for each transmitter. However, because it will consistently provide a conservative SAR measurement total, Nokia believes that this approach should be allowed as an alternative default for situations where more accurate methodologies are not practical.

The Commission also seeks comment on whether it would be practical with present SAR measurement systems to sum the SAR values at individual evaluation grid points prior to computing the 1-g average SAR. Nokia believes that the answer to this is no. While such a method may provide a more accurate total SAR measurement, in Nokia's opinion, it would

needlessly require significant additional time and resources from manufacturers. Instead, Nokia suggests that individual SAR tests should be carried out on all transmitters and that an overall SAR evaluation be made based on addition of area scan distributions. As noted above, it should also be acceptable to add together the SAR values individually obtained for each transmitter in order to estimate the total SAR when the device has enough margin to the compliance limit.

**D. Reference to OET Bulletin 65**

In the *NPRM*, the Commission proposes to replace references in its rules to the relevant IEEE standard regarding SAR evaluation guidelines for mobiles and portables with a reference to the most current edition of *Supplement C to OET Bulletin 65*. The Commission supports this proposal by explaining that a reference to Supplement C will allow for more rapid accommodation of revised guidelines than reference to a specific standards document, which can become outdated and which may require a rule amendment. While Nokia believes that recent revisions to Supplement C have benefited manufacturers by providing additional guidance in evaluating mobile and portable devices for compliance with the Commission's RF exposure guidelines, with the recent approval of the latest version of IEEE 1528, we support including a reference in the rules to this science-based and peer-reviewed standard. As noted in the *NPRM*, staff from both the FCC and the U.S. Food and Drug Administration are active IEEE participants and so are involved in developing these standards. IEEE 1528 represents the best and most current *international* standard for conducting SAR evaluations for portable devices. In response to the FCC's statement that specific standards can become outdated, Nokia suggests that the FCC's rules contain a reference to the IEEE standard, *as modified by the relevant IEEE committee*. This will ensure that the referenced standard always contains the most up to date evaluation methods. Nokia also suggests that the FCC's rules include a reference to the International Electrotechnical Commission (IEC) standard for body SAR measurement methods. This standard is currently under preparation and has benefited from the participation of FCC staff.

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[4] *NPRM*, ¶ 32 ("This, however, may overestimate RF exposure if different transmitters generate their maximum exposure at different locations in the body").

**E. Labelling Requirements for Consumer Products**

Nokia notes that the labelling proposals in the *NPRM* apply only to the specific services enumerated in paragraph 41, not including cellular, PCS or other CMRS services. Nokia believes that to the extent that CMRS licensees offer consumer-based fixed service with fixed, low power transmitters, product labelling should not be required. Rather, with regard to installation of such antennas, text in the installation guide (or in the installation section of a user's guide) should be included giving instructions on the siting of an antenna to ensure compliance with the exposure requirements.

**F. Compliance Evaluation based on SAR limits**

Nokia supports the Commission's proposal to amend Section 1.1310 to indicate that MPE values are derived from SAR values and that the option should be given for demonstrating compliance based on SAR evaluation.

**G. Spatial Averaging for Evaluating Compliance**

In the *NPRM*, the FCC notes that some confusion exists with regard to appropriate exposure evaluation methodologies in situations where spatial peak values may exceed the MPE limits. The FCC seeks comment on the best way to ensure compliance in such situations without requiring overly burdensome mandatory evaluations. Nokia suggests that the Commission should refer to the approach recommended in IEEE C95.3-2002 "Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields with Respect to Human Exposure to Such Fields, 100 kHz to 300 GHz" to address such situations.

**H. Transition Period**

Nokia believes that the new rules should become effective immediately upon publication in the Federal Register but should not become mandatory until one year following publication. In other words, there would be a one-year transition period during which manufacturers would be able to choose from among the current and newly adopted rules. This would allow manufacturers to become familiar with the new rules that may require evaluations for previously excluded

equipment but would allow manufacturers to immediately take advantage of those new rules that would accelerate the delivery of new products to consumers. Nokia believes that such a transition period is consistent with the FCC's goals in the *NPRM*.

Nokia recognizes that the FCC is faced with novel equipment authorization issues on a continuous basis and that a certain level of flexibility in the application of its equipment authorization rules is inherently necessary. However, Nokia suggests that, in order to ensure a more practical, predictable and efficient process, the FCC should release any new requirements or modifications of existing requirements it adopts in writing and that manufacturers should be provided a 12 month transition period to incorporate such new requirements into their new products. This will accelerate the delivery of innovative equipment to the public by eliminating the need to continually modify products to meet sometimes shifting requirements.

## III. CONCLUSION

For the foregoing reasons, Nokia generally supports the Commission's proposals to update its RF exposure rules. Nokia believes that many of the proposals in the *NPRM*, as modified by the suggestions herein, will help achieve the Commission's dual goals of ensuring that the public is appropriately protected from any potential adverse effects from RF exposure and avoiding and eliminating any unnecessary burdens in complying with its RF exposure rules.

Respectfully submitted,

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